10/21 BELL WORK
Define Index Fossil.

Get out pages 59 and 61 from YOUR binder.
INDEX FOSSILS

Some fossils can be used as index fossils to provide information about the age of rock layers. Not all fossils are index fossils.

An index fossil must have lived

• For a relatively short period of time
• In many places around the world

Which would make a better index fossil: A fern that has lived on earth since the Pennsylvanian period, 300 mya, or a trilobite that lived in many areas for only a few million years during the Cambrian period?
Page 55 in folder:
Identify and record the index fossil names and ages.
Page 41 in Green Book:
Index Fossil Key - use to identify fossils and ages.

* Not all fossils are index fossils.
<table>
<thead>
<tr>
<th>Rock layer</th>
<th>Index fossils identified</th>
<th>Ages</th>
<th>Temple Butte Limestone</th>
<th>Muav Limestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaibab Formation</td>
<td>Sponge - actinocoelia</td>
<td>Middle Permian</td>
<td>None</td>
<td>Trilobite: Glossopleura, Albertella</td>
</tr>
<tr>
<td>Torrean Formation</td>
<td>NONE</td>
<td></td>
<td>Muav Limestone</td>
<td>Middle Cambrian</td>
</tr>
<tr>
<td>Coconino Sandstone</td>
<td>NONE</td>
<td>Bright Angel Shale</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>Hermit Shale</td>
<td>NONE</td>
<td>Tapeats Sandstone</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>Supai Group</td>
<td>Brachiopod: Composita trilobata</td>
<td>late Penn</td>
<td>Sodium Limestone</td>
<td></td>
</tr>
<tr>
<td>Redwall Limestone</td>
<td>Brachiopod: Inflatia, Composita humulis</td>
<td>early &amp; late Miss</td>
<td>Sodium Limestone</td>
<td></td>
</tr>
</tbody>
</table>

*PAGE 55: PUT ON BACK OF PAGE 59 IN BINDER.*
If you find the same index fossil at both the Grand Canyon and Zion, what does that tell you about the age of the layers in which the fossils are found?
Identify the index fossils in the Bryce and Zion rocks and record their identifications on your own piece of notebook paper. Put the layer's name and fossil names.
10/23

Bell Work: Define Index Fossil...yes again!

Get out pages...55 (on back of 59), 59 and 61.
Now correlate the rocks at all 3 parks (Grand Canyon, Bryce & Zion). Cut out the rock layers for Bryce and Zion from page 61 in binder. Glue onto page 59 in binder.

Complete page 63 (Index-fossil correlation questions) in binder. We will go over your answers before I collect any of your work.

Reading: *A Fossil Primer*. Answer questions on page 65 in binder.
INDEX-FOSSIL CORRELATION QUESTIONS

Answer these questions after you have identified and correlated the rock layers at the three parks.

1. Which rock layers contained the same index fossils at Zion and the Grand Canyon?

2. Which rock layers contained the same index fossils at Zion and Bryce?

3. Which rock layers contained the same index fossils at Grand Canyon and Bryce?

4. Is rock layer B3 at Bryce older or younger than Supai Group at the Grand Canyon? How do you know?

Younger; B3 comes between layers B5 and B1, which contain identifiable index fossils. B5 contains fossils from the late Jurassic. B1 contains fossils from the early Triassic. Z1 and the Kaibab in the Grand Canyon contain the same index fossils, making them Permian age. The Supai Group contains index fossils from the late Pennsylvanian. So, B3 has to be older than early Triassic, making it younger than the Supai Group.
5. Is rock layer B2 at Bryce older or younger than rock layer Z1 at Zion? How do you know?

Younger; Z1 contains Permian index fossils. B1 contains fossils from the early Triassic, making it younger than Z1. B2 is on top of B1, so it is younger than B1. So it is also younger than Z1.

6. What do you think the environment was like at the time layer B9 was being deposited at Bryce?
EXIT TICKET
Explain how an index fossil can be used as key for the age of a sedimentary rock layer. Answer on 1/2 sheet of notebook paper.
1a. Hutton came up with the idea that the present is the key to the past (principle of uniformitarianism). His ideas showed people they could observe process today to come up with ideas about how to interpret past environments from evidence captured in rocks.

1b. Lamarck was the first person to define the word fossil. He studied animals without backbones. He demonstrated how to use the evidence from rock types, fossils, and the principle of uniformitarianism to reconstruct prehistoric environments.

1c. Smith figured out how to use index fossils to come up with a relative age for rocks. He helped develop the science of stratigraphy, the study of the order and correlation of Earth's rocks and the study of historical geology.
Pages 65-66
3. The rock layer that contained fossil B might not have been deposited or it could have eroded away. Fossil B might not have lived in this area or no specimens were preserved there. You might look to see where fossil B is found and trace the layer as far as it goes.

4. Maybe the rocks turned upside down, or these weren't very good index fossils. You could follow the layer to see if it turned upside down somewhere or look for another place in the area where fossils were in the "right" order. Or you might need to some more exploration to show that these were not good index fossils because they were found over a longer period of time.
5a. The basalt dike is younger than rock layers B, C, D and E because it passes through all of these rock layer. The rock layers had to be there first. Rocks B, C, D, and E were deposited on top of rock A, so this means they are younger than A. So the relative ages of B, C, D, and E are somewhere between 200 million years old and 225,000 years old, with rock B the oldest and rock E the youngest.

5b. Since the magma had to flow through the crack to get to the surface, it was there before lava erupted on the surface, forming the volcano. If it cooled first, then the dike is older than the volcano.